



GGOS



Global Geodetic Observing System

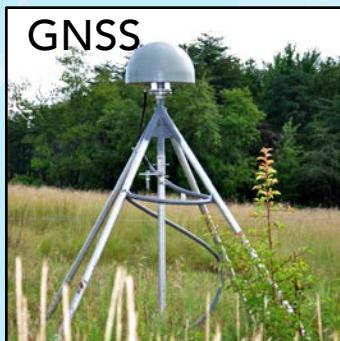
Carey Noll
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(on behalf of GGOS)

WDS Forum
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Global Geodetic Observing System

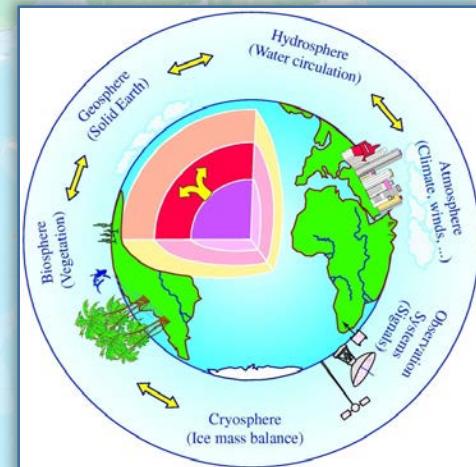
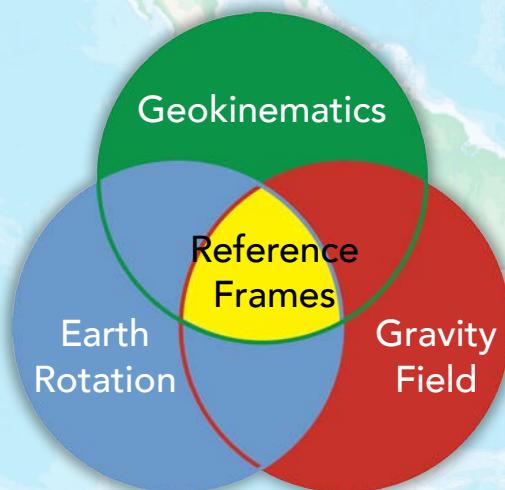


- Observing System of the International Association of Geodesy (IAG)
- Vision: Advance our understanding of the dynamic Earth system by quantifying our planet's changes in space and time
- GGOS works with IAG components to provide the geodetic infrastructure necessary for monitoring the Earth system and for global change research
- Partner member of WDS since January 2016
 - Extensive cooperation with other WDS network members (IGS, ILRS, IVS, IDS, etc.) and regular members (e.g., CDDIS)



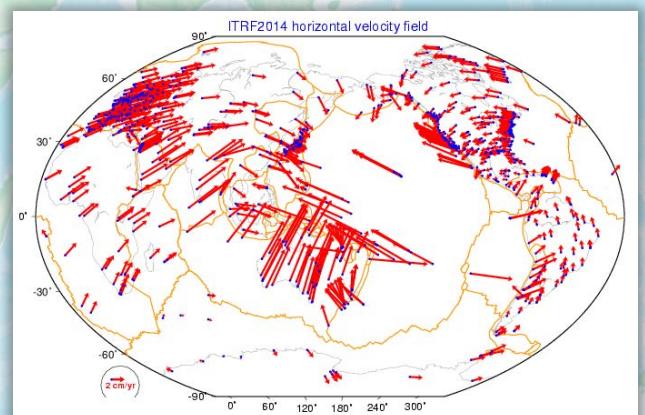
Geodesy 101

- Geodesy measures:
 1. Shape/geometry of the Earth
 - Topography, bathymetry, ice surface, sea level
 2. Orientation of the Earth in space
 - Polar motion, Earth rotation, nutation, precession
 3. Gravity field of the Earth
 - Gravity, geoid
- Space geodesy:
 - Making these measurements between ground-based instruments and objects in space
 - Geodetic techniques observe the components of the System Earth:
 - Solid Earth (deformation, gravity)
 - Atmosphere (signal travel time)
 - Hydrosphere (gravity, altimetry)
 - Cryosphere (laser/radar scanning)



Space geodesy: Motivation

- Everything is moving!
- Earth processes can have a devastating impact on our society and our economies (earthquakes, rising sea level, floods, drought, storms, tsunamis, etc.)
- Geodesy monitors the Earth system, e.g.,
 - Plate motions
 - Solid Earth loading phenomena (ice, ocean, atmosphere)
 - Earthquakes ...
- Space geodesy networks are fundamental to monitor and understand Earth processes for both ground and space measurements



<http://itrf.ign.fr>

GGOS: Cooperative operation

- GGOS relies upon cooperation and participation of the IAG services
 - Networks of observing stations, providing data
 - Analysis centers, generating products
 - Data centers, archiving data and products
 - User community, utilizing data and products for research and applications
- Data and derived products managed by long-term archives
 - Several both network and regular members of WDS
 - Open data policy
 - Utilize ISO standards where applicable



International geodetic services



- IAG established international, cooperative partnerships to facilitate research
- Services function as “cooperating federations” dedicated to a particular type of data
- Provide data and products on an operational basis to geodesy analysts as well as a broader scientific community
- Examples of a successful model of community management:
 - Develop standards
 - Self-regulating
 - Define and deliver products using pre-determined schedules
- Successful operation through cooperation of many international organizations who leverage their respective limited resources to all levels of service functionality



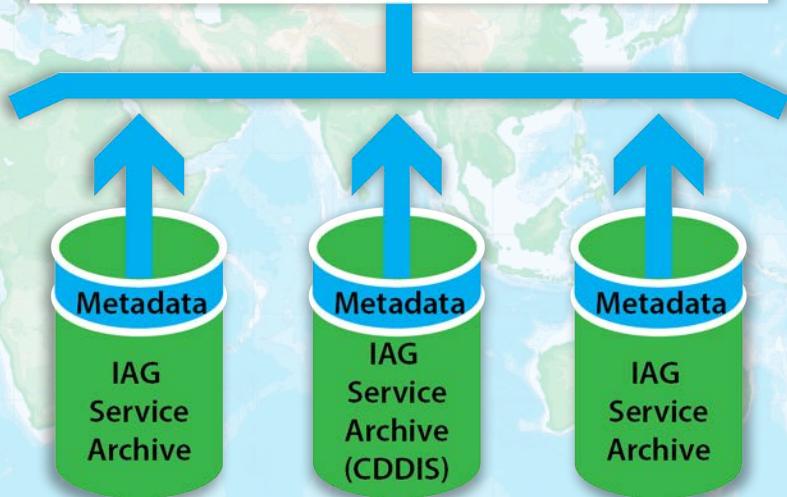
All are **network members of** →



GGOS Portal: Data discovery



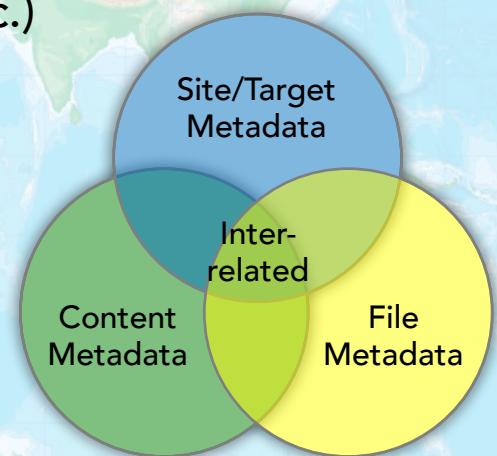
- GGOS information
 - GGOS focus areas
 - Science topics
- Access
 - Discovery: search data/product catalogs
 - Map viewer: display data
 - Applications: data mining of GGOS products



GGOS: Metadata efforts



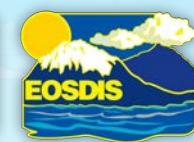
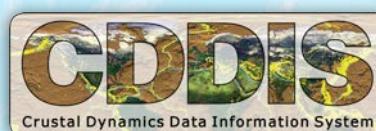
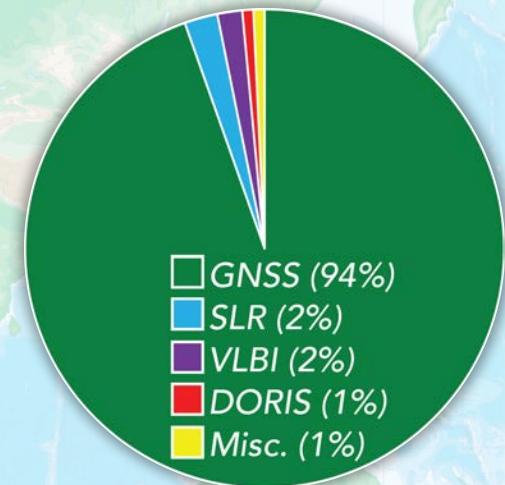
- Efforts within Standing Committee on Data and Information (part of GGOS Bureau of Networks and Communications)
 - Establishing a Metadata Working Group to help formulate a plan for GGOS metadata and advise on implementation
- Metadata implementation essential to GGOS Portal and will focus on data products and descriptive information
- Developing a proposal for a “GGOS Metadata Schema” for review within the MWG and the services
 - Compatible with standards (ISO 19115, EOSDIS, etc.) and new efforts (eGeodesy)
- Incorporate additional metadata required by IAG services
 - Station, target, ... information



GGOS archive example: CDDIS



- One of the data centers supporting the IAG services and thus a contributor to GGOS
- Regular member of WDS
- Archive consists of data and derived products from over 1500 observing sites from about 1000 locations around the world, going back in time as far as 1975
 - File size is typically <2-10 Mb/data or product granule
 - Total archive size: ~15.7Tb
 - Ingest rate: ~9.5Gb (90K files)/day
 - Distribution rate: ~475Gb (~4.4M files)/day
 - Multi-day, daily, hourly, sub-hourly
 - Varying latencies (minutes, hours, days)
 - Archive is updated with new data/product files on varying time scales, dependent on the data type, from a sub-daily basis to weekly basis



Successes/Challenges/Best Practices



- Successes:
 - Cooperation with global institutions to further scientific research through geodesy infrastructure
 - Expansion of cooperating network
 - Inclusion of additional measurements
- Challenges:
 - Inclusive metadata schema to address data discovery requirements
 - Disparate services have different requirements
- Best practices:
 - Open data policy
 - Collaboration among contributing services in various areas:
 - Data archiving
 - Metadata
 - Creation of bureaus to focus on common topics
 - Network development/observations
 - Product development

Thank you!

- For more information:
 - GGOS: <http://ggos.org>
 - GGOS portal: <http://www.ggos-portal.org>
 - IAG: <http://www.iag-aig.org>
 - IAG services:
 - International GNSS Service (IGS): <http://www.igs.org>
 - International Laser Ranging Service (ILRS): <http://ilrs.gsfc.nasa.gov>
 - International VLBI Service for Geodesy and Astrometry (IVS):
<http://ivscc.gsfc.nasa.gov>
 - IDS: <http://ids-doris.org>
 - CDDIS: <http://cddis.nasa.gov>
 - EOSDIS: <http://earthdata.nasa.gov>